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**(54) SEMICONDUCTOR DEVICE STRUCTURE  
AND MANUFACTURING METHOD  
THEREOF**

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H01L 29/66795; H01L 29/0649; H01L  
29/165; H01L 29/7848; H01L 29/7851;  
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USPC ..... 257/288, 368, 369; 438/151, 197, 199,  
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See application file for complete search history.

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(51) **Int. Cl.**

(57) **ABSTRACT**

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Some embodiments of the present disclosure provide a semiconductor device. The semiconductor device includes a semiconductive substrate; a gate structure over a fin structure of the semiconductive substrate; a channel portion of the fin structure under the gate structure; and at least one epitaxy region disposed over the semiconductive substrate and in contact with the channel portion. The epitaxy region includes a substance with a first lattice constant larger than a second lattice constant of the semiconductive substrate; and a concentration profile of the substance in the epitaxy region being decreasing from near a bottom portion to near a top portion. The bottom portion is closer to the channel portion than the top portion.

*H01L 29/165* (2006.01)

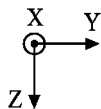
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**16 Claims, 23 Drawing Sheets**



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